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ACTIVE MANAGEMENT OF ELECTRICAL NETWORKS WITH A HIGH SHARE OF DISTRIBUTED GENERATION

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ABSTRACT

In the European research project DISPOWER, Fraunhofer ISE together with three partners developed a "*Power Flow and Power Quality Management System*" (PoMS), which was tested in a utility pilot installation in the year 2005. With this system, a new approach regarding the integration of distributed electricity generators, storage systems and controllable loads into low voltage grid segments has been devised and successfully tested. For the test of PoMS an economic optimisation of the grid operation from the perspective of the grid operator has been defined as central target. Therefore the optimisation problem has been transferred into a mathematical model, which establishes a linear, mixed-integer optimization problem, that can be solved with the help of appropriate standard software. This approach is such flexible, that it would have been also possible to choose alternative targets, like the reduction of CO_2 emissions, a minimization of energy losses on cables or others. The other significant option of PoMS is its potential for improving power quality. Significant advantages of the implemented algorithm are, that it is universal and that it adapts its internal parameters automatically according to the actual needs of the grid. The average value of PQ improvement during simulation tests was 80%. The results of PoMS test operation under real conditions were so promising, that it was decided to prolong the test period until 2007.